

The lessons learned from this trial are at present being applied to the delivery of a second semester chemistry unit to a much larger group of students which includes many of those involved in

campus. Technical difficulties encountered as a result of using improvised hardware are gradually being overcome and it is anticipated that the video link will be extended in 1998 to include the delivery of first and second year units in biochemistry, chemistry, computing, earth science, physiology and mathematics.

## Multimedia in the Teaching of First Year Biology: The Use of Graphics and Animations

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First year biology introduced computers to the learning environment to help students understand topics which are difficult to conceptualise and are often difficult to demonstrate in the laboratory, to encourage students to take responsibility for their own learning and to enhance group learning skills. We deliver computer-based assessment (formative and summative), computer-based teaching modules and web-based materials.

Biology is a very visual subject, thus high quality images and animations are essential, enabling biological processes to be illustrated in an animated and interactive manner. Pictures have a direct route to long term memory with each image being stored as a coherent “chunk” or concept (Paivio et al, 1968), and without useful meaning the pictures are not easily committed to memory (Freedman and Haber, 1974). Guidelines summarised by Levie and Lentz (1982) in an extensive review of the effects of illustrated text against text alone suggest:

- the presence of pictures relevant to the text will assist learning;
- pictures not covered by the information in the text will not enhance the learning of the text;
- the presence of pictures in the text will not aid the learning of the text which is not illustrated;
- pictures can help learners to understand what they read and also to remember it;
- pictures can sometimes be used as substitutes for words or as producers of nonverbal information;
- learners may fail to make full use of complex illustrations; and
- pictures may assist learners with poor verbal skills more than those with good verbal skills.

The use of graphics and animations in our computer-based teaching modules and web-based materials is designed to stimulate understanding and help in remembering the detail. Graphics are chosen for their meaningful input in portraying or understanding biological content.

Graphics have been generated from original art work, both computer and paper based, and sources such as clipart, textbooks, magazines, video camera microscopy etc. These images have been generated using Adobe Photoshop, Aldus SuperPaint and Avid VideoShop. Some images have been manipulated to create animations using Elastic Reality (ASDG), ADDmotion (Motion Works), Director (Macromedia) and Authorware (Macromedia), and incorporated into our computer-based materials.

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## References

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- Levie W H and Lentz R (1982). *Effects of text illustrations: a review of Research*. Educational Communication and Technology Journal, 30: 195-232.
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## UniServe Science narrows the field

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### The value of computer-based images in teaching and learning

With the increased use of computers in education it is essential that educators use this technology to enhance student learning. To do this effectively the technology must cater for different learning styles and support the processes students use when they learn. In order to assimilate the new information correctly and gain a broad understanding of it the student needs repeated exposure to variations of the concept and must be actively involved in the learning process. Computer-based images, both still and moving, can be used to provide an environment in which this can occur. For example, interfacing equipment in the laboratory allows the students to conduct 'what if' scenarios with lab exercises; plotting software allows students to plot several variations of a function; and science microworlds (or simulations) enable students to explore a particular problem area by inventing their own activities and experimenting, testing and revising hypotheses.

### Need for caution

Computer-based images can expose students to variations of a concept and they can stimulate students to become actively involved in their learning. However, this is not always the case. Some pictures aid learning. Some do not aid learning but do no harm. Others do not aid learning and are distracting or even misleading. Many multimedia programs are still based on behavioural models of learning that emphasise only individual learning and feedback. Morgan (1996) reminds us that we must always evaluate whether our use of technology in education really does support student learning.

Ring (1996) notes that although interactive multimedia has provided richer human-computer interaction much of it is quite complex and difficult to use. Care must be taken to avoid student confusion or information overload through complex or poorly designed images. It is also becoming apparent how easily designers can distort reality using new video and imaging technologies. This is particularly dangerous in an educational setting as the student is left with incorrect knowledge.

In addition, the added emphasis on the use of graphics and the availability of tools which make adding graphics to software applications very easy, increases the likelihood that instructional designers will lose sight of their original goals. Rieber (1994) reminds us that, with graphics in particular, there is a strong tendency to let technology, rather than teaching and learning objectives, dictate decision making. Often designers and consumers of educational software unconsciously fall into this trap. They encourage the use of all special features, instead of questioning whether such